SERVIR and Public Health

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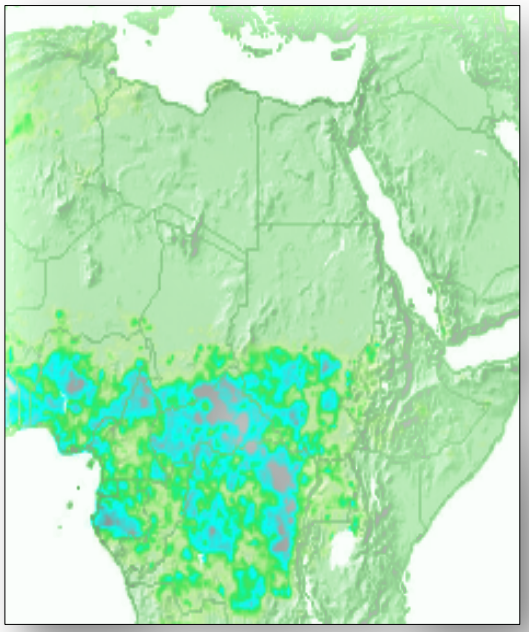
NASA

Outline

- What is SEVIR?
- SERVIR centers (Hubs)
  - Mesoamérica
  - East Africa
  - Hindu Kush-Himalaya
- SERVIR applications
- ROSES solicitation for SERVIR Applied Sciences Team (SERVIR AST)
- SERVIR and Public Health
  - SERVIR AST
    - Flood Risk Mapping, Water Bodies Monitoring and Climate Information
    - Applications of Satellite Products for Air Quality Monitoring, Analysis, Forecasting, and Visualization
  - Dengue
  - Air Quality Modeling over Mesoamerica
  - SERVIR and DEVELOP in Colombia
- Summary

What is SERVIR?

A NASA-USAID partnership to improve environmental management and resilience to climate change by strengthening the capacity of governments and other key stakeholders to integrate Earth observations into development decision-making



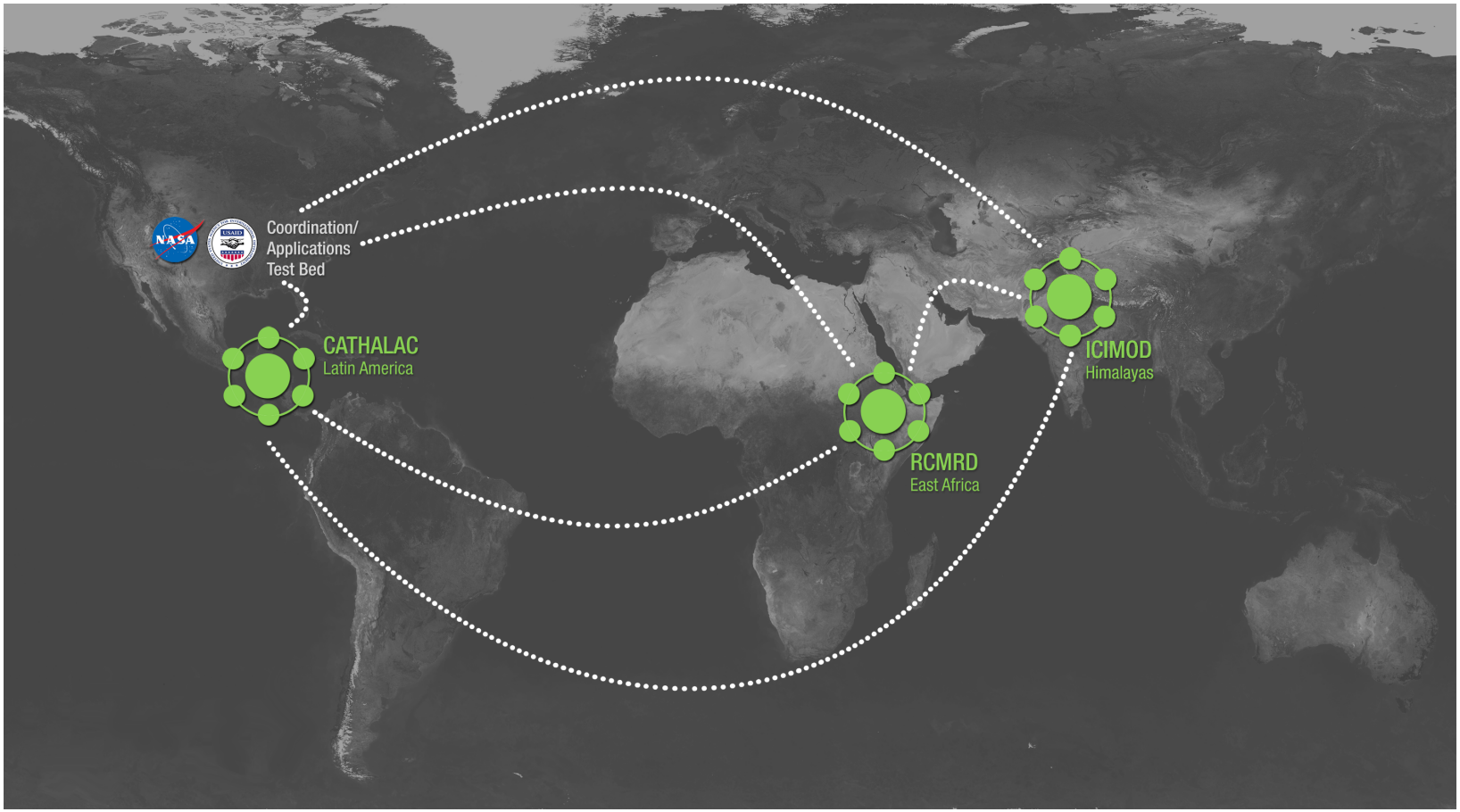
Flood Forecasting in Africa

Training and Capacity Building

Mapping Fires in Guatemala Mexico

- Visualizations
- Online Maps
- Data and Models
- Decision Support
- Training
- Partnerships

SERVIR Network



SERVIR
MesoAmerica@CATHALAC

Inaugurated on February 3, 2005

SERVIR East Africa@RCMRD

Inaugurated on
November 21, 2008

SERVIR Hindu Kush-Himalaya@ICIMOD

Inaugurated on
October 5, 2010

SERVIR Applications

SERVIR Applications have several dependencies:

- **NASA Applied Science Program**
  Disasters, Ecological Forecasting, Health and Air Quality, Water Resources

- **US GEO**
  Agriculture, Biodiversity, Climate, Disaster, Ecosystems, and Human Health

- **USAID**
  Climate change adaptation, Sustainable Landscapes and GEO focus areas

- **Regional Needs Assessment**

SERVIR AST

- NASA ROSES-2011 (Research Opportunities in Space and Earth Sciences) call for proposals included a solicitation for SERVIR Applied Sciences Team (SERVIR AST)

- SERVIR regional hubs were engaged to define societal benefit areas of emphasis for the 3 regions

- Solicitation was structured to create a team of scientists that work on their individual projects, with funds included for *ad hoc* team projects to address new and/or critical needs based on regional and/or national priorities

- The selections were announced earlier this year and the SERVIR AST has 11 core members consisting of the PIs of selected proposals, with selected project Co-I's and collaborators serving as part of the extended team, during the course of their funded projects.

SERVIR AST

PI Last name	Title	Institution	Theme	Region
Laporte	Forest carbon assessment for REDD in the East Africa SERVIR region	The Woods Hole Research Center	Carbon	East Africa
Kargel	Interdisciplinary science applications to glacier and alpine hazards in relation to development and habitation in the Hindu Kush-Himalaya: SERVIR Science Team project	University of Arizona	Disasters	Hindu Kush-Himalaya
Hossain	A Satellite-based Early Warning, Mapping and Post-Disaster Visualization System for Water Resources of Low-lying Deltas of the Hindu Kush-Himalayan region	Tennessee Technological University	Water	Hindu Kush-Himalaya
Verdin	A Long Time-Series Indicator of Agricultural Drought for the Greater Horn of Africa	U.S. Geological Suvey	Agriculture	East Africa
Blackman	Using Earth Observation Data to Improve REDD+ Policy in Mesoamerica and the Dominican Republic	Resources for The Future, Inc.	Carbon	Mesoamerica
Huff	Applications of Satellite Products for Air Quality Monitoring, Analysis, Forecasting, and Visualization in the SERVIR Mesoamerica and Himalaya Regions	Battelle Memorial Institute	Air Quality	Mesoamerica, Hindu Kush-Himalaya
Robertson	Leveraging CMIP5 and NASA / GMAO Coupled Modeling Capacity for SERVIR East Africa Climate Projections	NASA / MSFC	Climate Scenarios	East Africa
Granger	East Africa Drought and Agricultural Productivity Assessment and Prediction System	Jet Propulsion Laboratory	Disasters, Agriculture	East Africa
Valdes	SERVIR Water Africa-Arizona Team (SWAAT)	The University of Arizona	Water	East Africa
Kirschbaum	Landslide Hazard Assessment and Forecasting System using near real-time remote sensing information over SERVIR-Mesoamerica	NASA Goddard Space Flight Center	Disasters	Mesoamerica
Ceccato	Development and Implementation of Flood Risk Mapping, Water Bodies Monitoring and Climate Information for Disaster Management and Human Health (integration within SERVIR)	Columbia University	Public Health	East Africa

Public Health
SERVIR AST

- Title: Development and Implementation of Flood Risk Mapping, Water Bodies Monitoring and Climate Information for Disaster Management and Human Health

- PI: Pietro Ceccato/Columbia University

- Objective: Improve the capacity to integrate NASA remotely-sensed products within SERVIR for the benefit of the Ministries of Health in East Africa, President's Malaria Initiative (PMI) and for the International Federation of Red Cross and Red Crescent Societies (IFRC) to improve their decision-making process.

Air Quality
SERVIR AST

- Title: Applications of Satellite Products for Air Quality Monitoring, Analysis, Forecasting, and Visualization in the SERVIR Mesoamerica and Himalaya Regions

- PI: Amy Huff/Battelle Memorial Institute

- Objective: Use earth observations and modeling systems for air quality monitoring, analysis, forecasting, and visualization in the SERVIR Mesoamerica and Himalaya regions

- One component of this effort is air quality modeling (CMAQ) for Mesoamerica

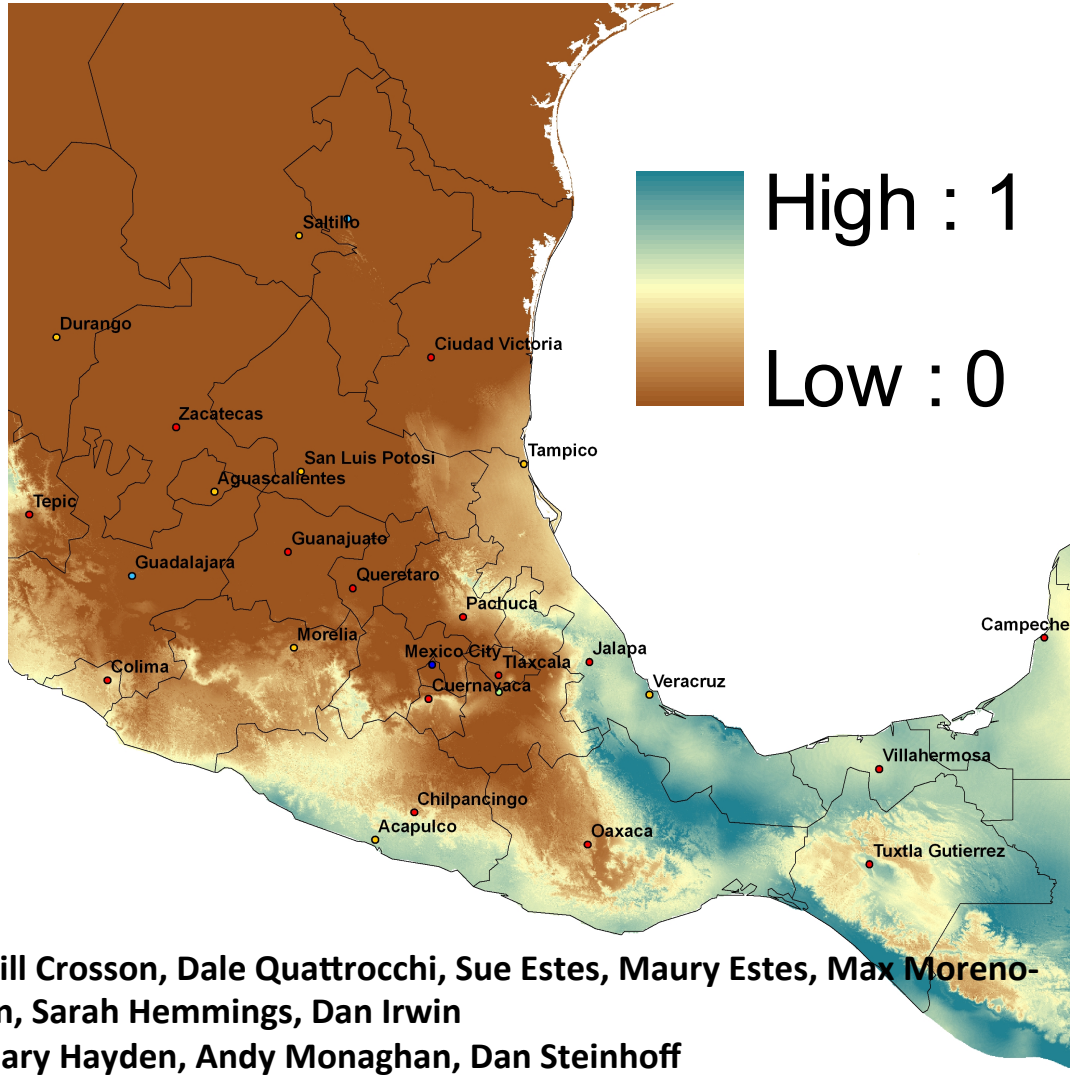
Aedes aegypti habitat model

- **A regression model was developed using 2011 field data to estimate the spatial pattern of *Aedes aegypti* 'potential presence'.**
- **Independent variables:**

✓**Elevation**

✓**Past 30 days min/ max temperature, rainfall**

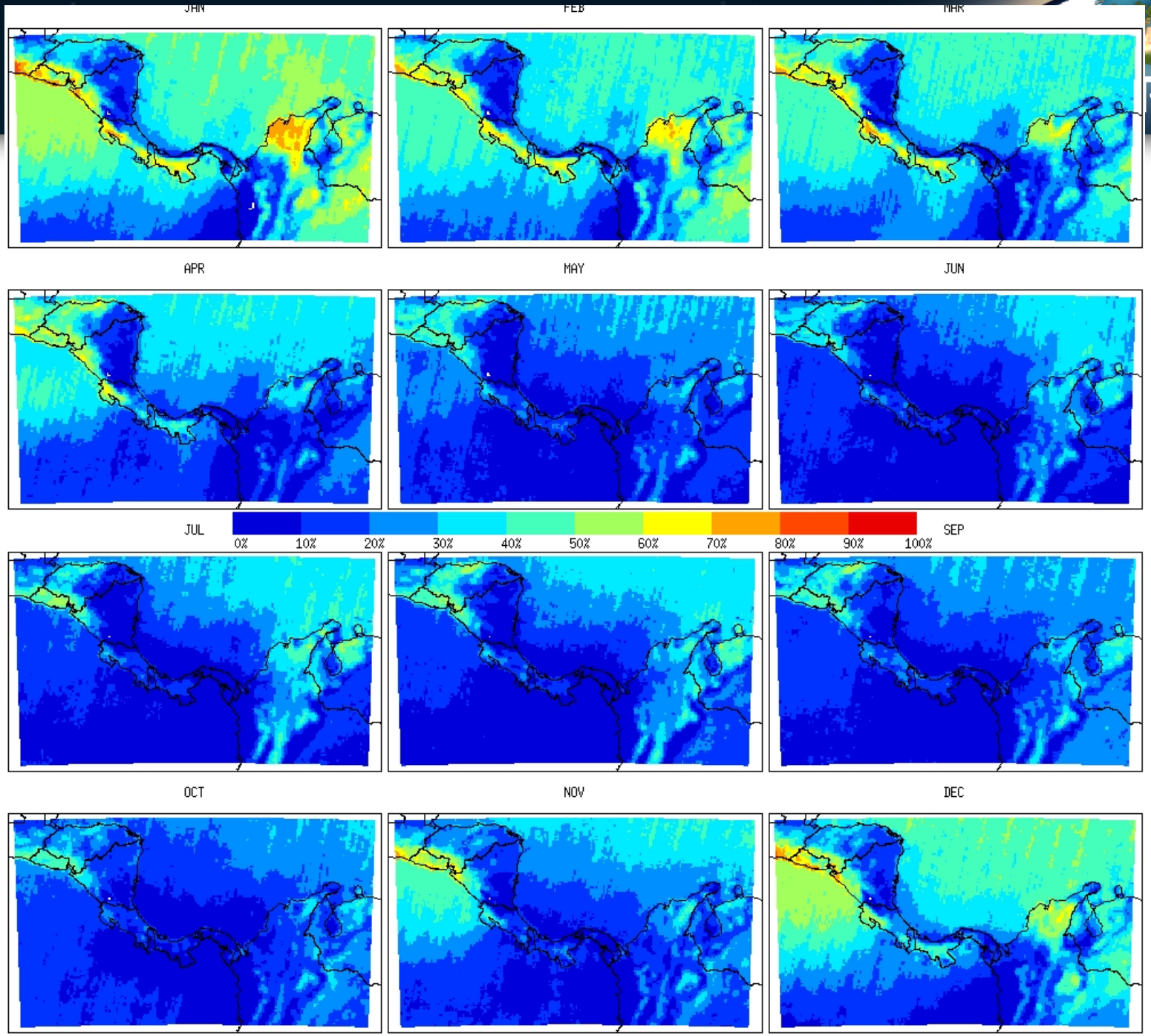
✓**Winter mean min temperature**



NSSTC: Bill Crosson, Dale Quattrocchi, Sue Estes, Maury Estes, Max Moreno-Madriñán, Sarah Hemmings, Dan Irwin
NCAR: Mary Hayden, Andy Monaghan, Dan Steinhoff
CDC: Emily Zielinski-Gutierrez
U. Veracruz: Carlos Welsh-Rodriguez, Saul Lozano, Lars Eisen

Air Quality Modeling over Mesoamerica: Objectives

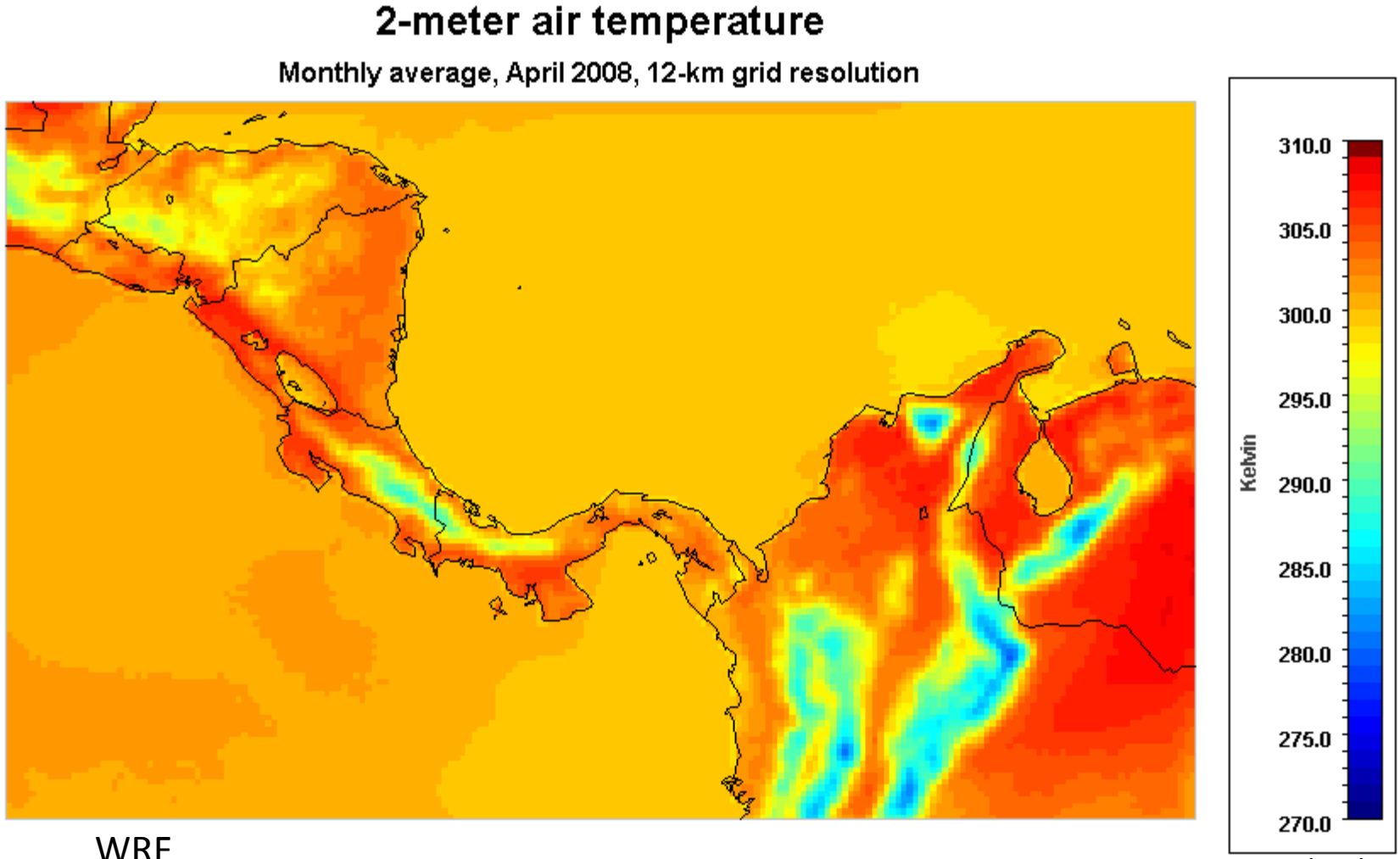
- Key questions:
  - How much long-range air pollution transport, natural sources, and anthropogenic emissions contribute to poor air quality?
  - Relative contributions?
  - What sources and/or source categories are responsible for poor air quality?
- Training and transference of modeling expertise to set up a high resolution modeling over the region
- Feed back of any local emission data to the original model system



Pawan Gupta at Goddard Space Flight Center

Maudood N. Khan

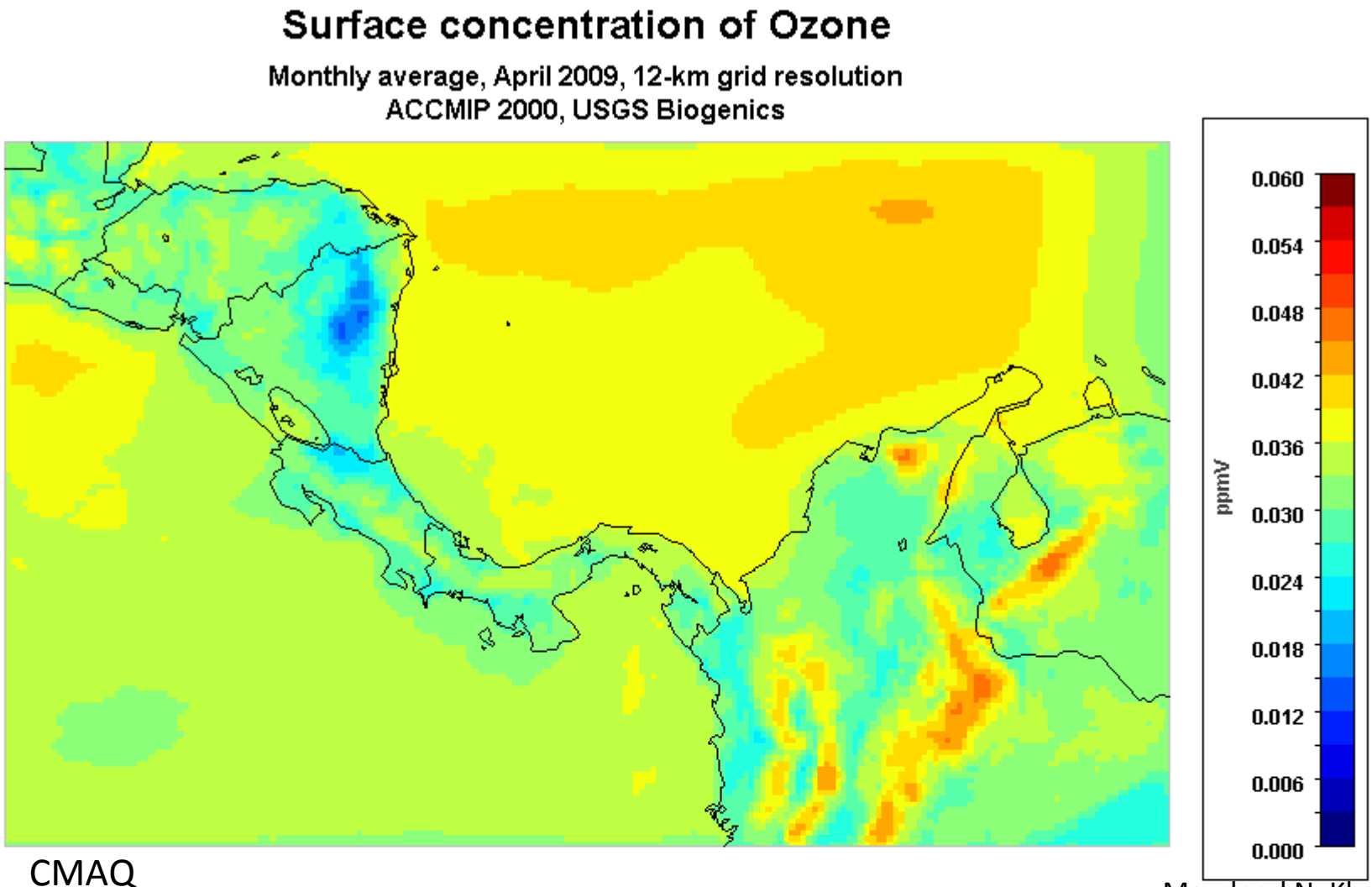
18 UTC



WRF

Maudood N. Khan

12 UTC

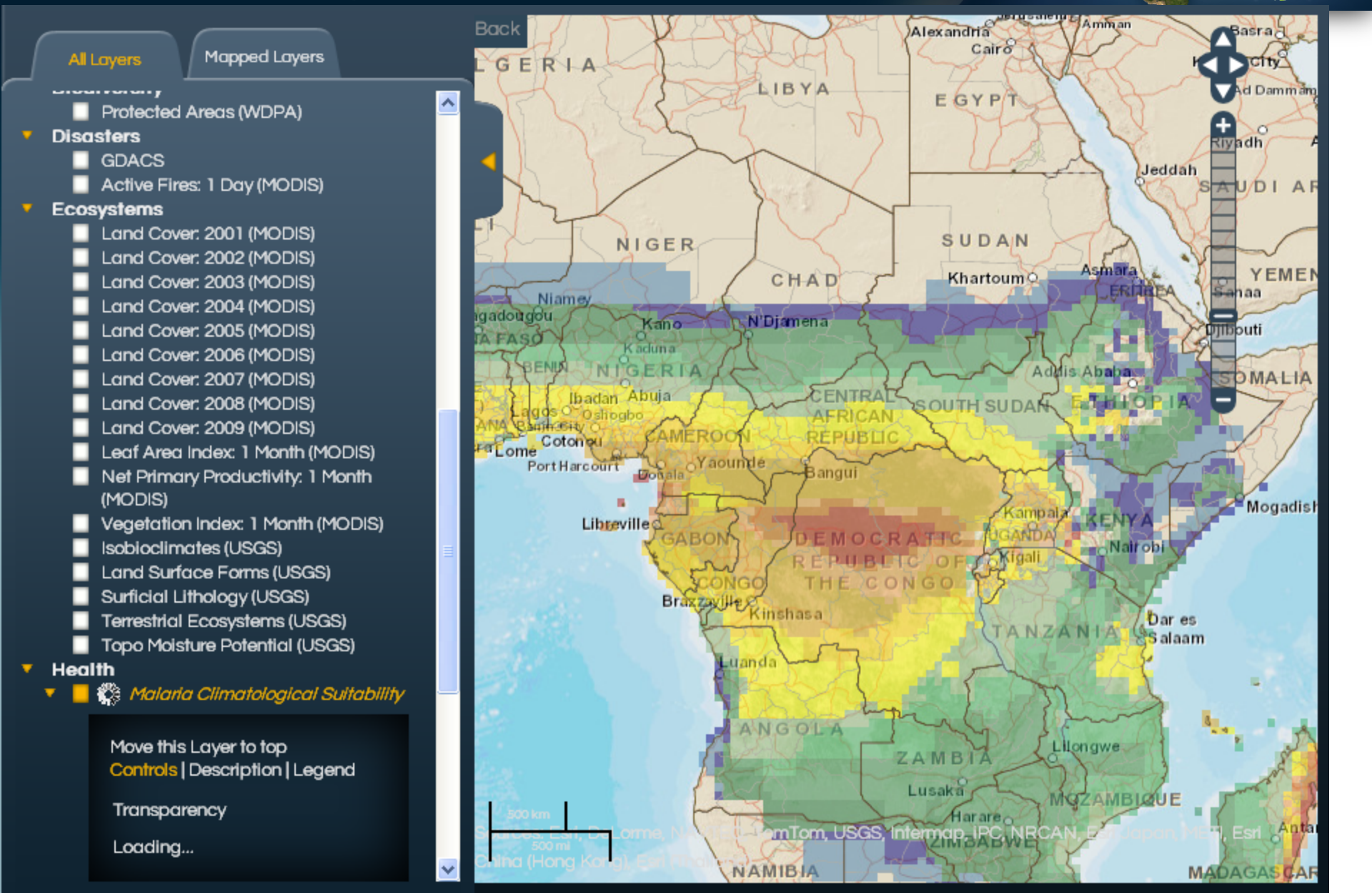


CMAQ

Maudood N. Khan

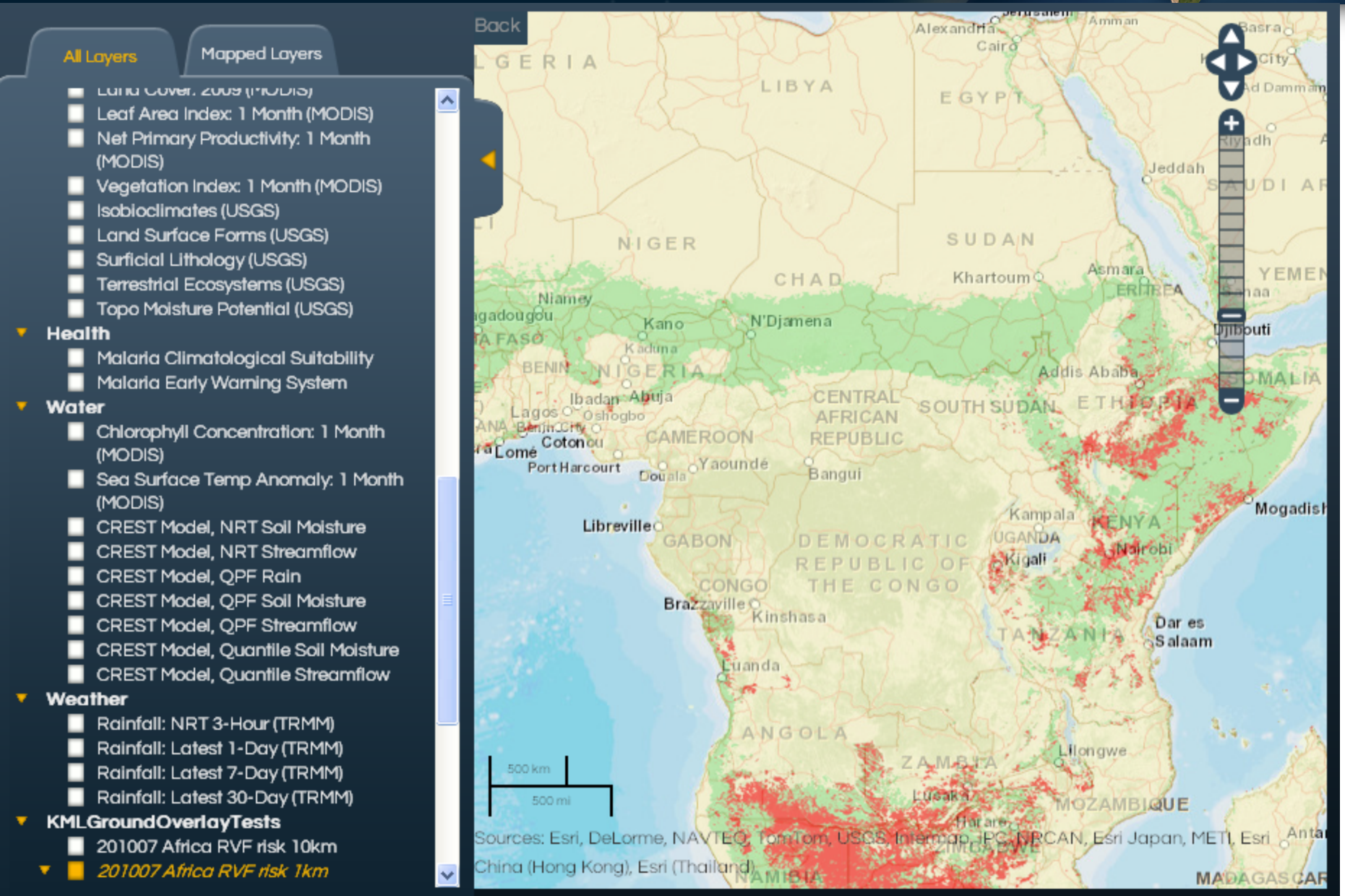
Malaria Climatologically Suitability

Pietro Ceccato/Columbia University



Future projects: Rift Valley Fever

Jorge Pinzón / Goddard Space Flight Center

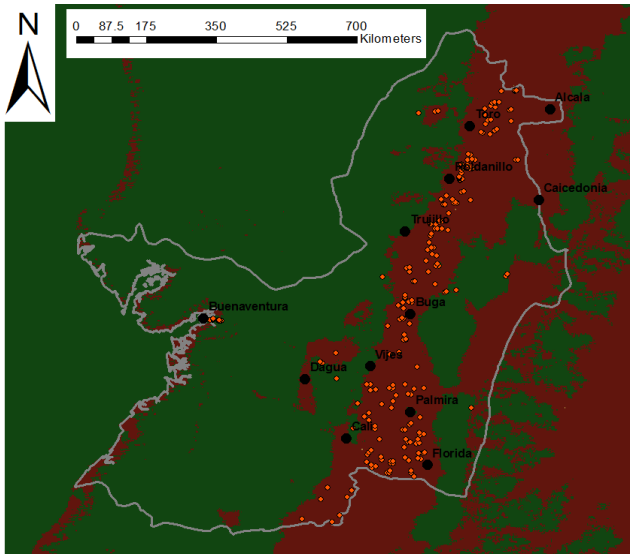


NASA building capacity in Colombia

NASA supports efforts of research, training and capacity building in a joint collaboration between the University of Alabama in Huntsville (UAH) and Universidad Autónoma de Occidente (UAO) , Cali, Colombia. This collaboration is made possible through NASA's DEVELOP program and SERVIR project.

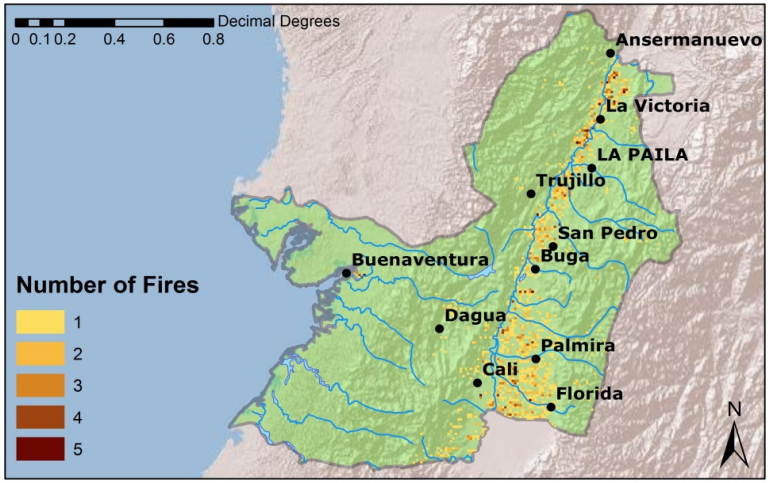
Using Earth observations and products, students from both universities work together to identify the best environmental and socio/cultural variables associated with wild fires in the Valle del Cauca, Colombia.

The result of this work will generate a multivariable model to estimate the likelihood of fires, which will be useful to environmental and public health managers to better allocate resources in key areas

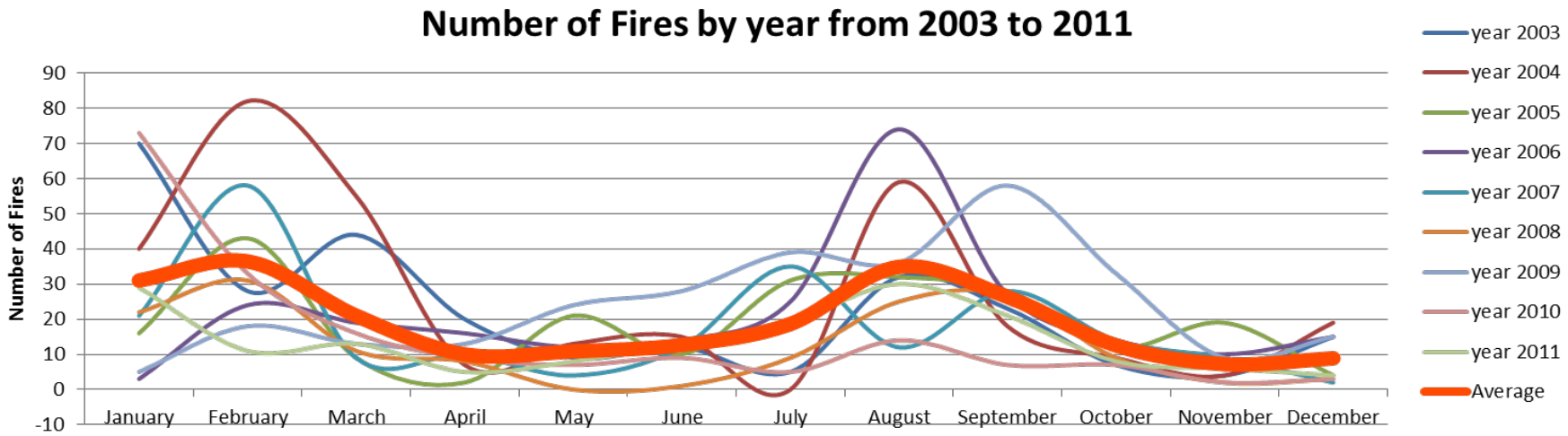


Burn Scar Mapping

NASA building capacity in Colombia, cont.

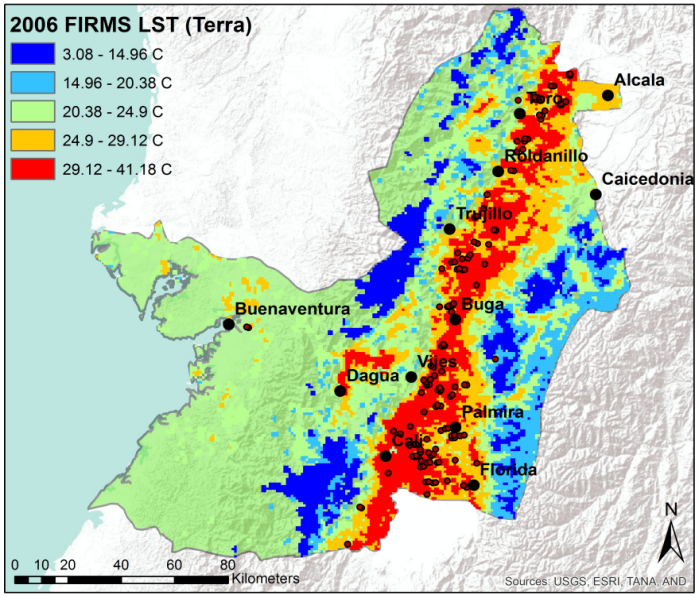


- The figure to the left shows the location and gradient of abundance of fires during the 2003-2011 period based on data from NASA's MODIS sensor onboard the Terra and Aqua satellites.
- The figure bellow shows the temporal distribution of fires during the year for the same time period. The average peaks coincide with the periods of lowest rainfall.

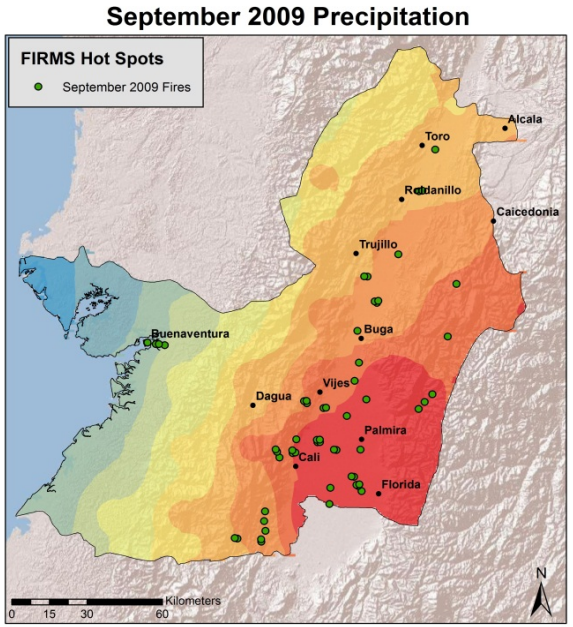


NASA building capacity in Colombia, cont.

Input: Remotely sensed and *in situ* data → Analysis of associations → Selection of best associations → Multivariable model



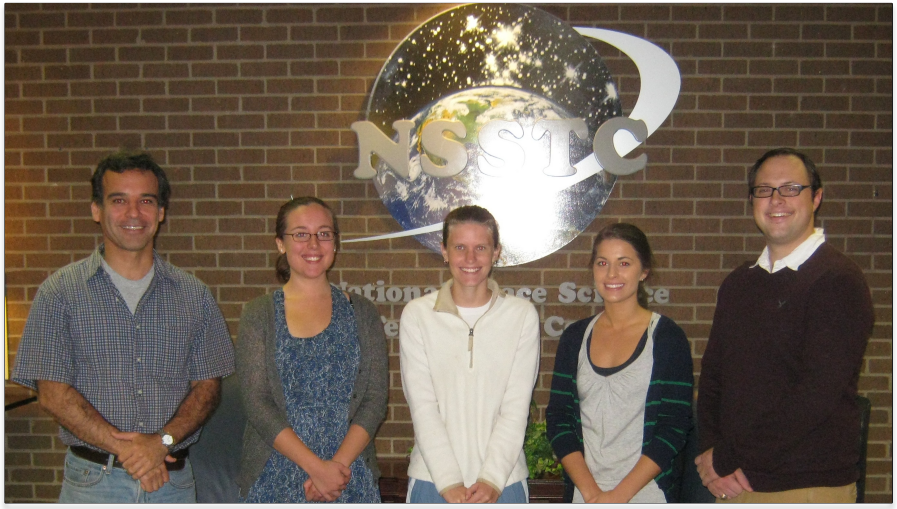
This image shows the geographical distribution and range of average land surface temperature during the year 2006 based on data from NASA's MODIS sensor on board of Terra and Aqua satellites.



This image shows the precipitation accumulated during September, 2009, using data from the TRMM satellite. TRMM is a join mission between NASA and JAXA (Japan Aerospace Exploratory Agency).

NASA's DEVELOP teams with SERVIR

Colombia Fire Forecasting: Feasibility Study.



UAH team

UAO team

The North-South collaboration between University of Alabama in Huntsville (UAH) and Universidad Autónoma de Occidente (UAO), Colombia, is part of the coordination between SERVIR and DEVELOP.

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Summary

- SERVIR is committed to linking ROSES funded work to help decision making in SERVIR regions. We are eager to collaborate with other Applied Science projects, the synergy is critical for the program

- SERVIR AST is an important step in linking the needs of SERVIR regions to the NASA-funded research and application development

- Public Health, Air Quality and Water Resources continue to be key issues for all SERVIR regions